



What is claimed is:

SSN 10/281,373  
Filed 10/25/2002  
Our Ref. 789.035 DIV  
(Div of USSN 09/676,200)  
NOV-8 2002  
TECHNOLOGY CENTER 2800

1. A method of producing a piezoelectric/  
electrostrictive device comprising:  
a pair of mutually opposing thin plate sections made  
of metal and a fixation section secured to said thin  
plate sections;  
a movable section provided at forward end portions  
of said pair of thin plate sections; and  
at least one piezoelectric/electrostrictive element  
arranged on at least one thin plate section of said pair  
of thin plate sections, the method comprising:  
providing a first substrate;  
securing metal plates to said first substrate to  
form a second substrate; and  
subjecting said second substrate to at least one  
cutting treatment to form one of said movable section and  
said fixation section;  
wherein said metal plates define said thin plate  
sections and said one of said movable section and said  
fixation section has mutually opposing end surfaces, a  
distance between which is not less than a length of said  
movable section.
2. The method of producing a piezoelectric  
/electrostrictive device according to claim 1, further  
comprising the step of securing said piezoelectric  
/electrostrictive element to an outer surface of at least  
one of said metal plates by the aid of an adhesive.
3. The method of producing a piezoelectric  
/electrostrictive device according to claim 1, wherein  
said piezoelectric/electrostrictive element is secured to

the outer surface of at least one of said metal plates before said metal plates are secured to said first substrate.

4. The method of producing a piezoelectric /electrostrictive device according to claim 1, wherein said first substrate comprises a metal laminate, and said method further comprises laminating a plurality of metal sheets to form said first substrate, wherein each metal sheet has at least one window formed therethrough.

5. The method of producing a piezoelectric /electrostrictive device according to claim 4, wherein at least one of said plurality of metal sheets define at least one of said mutually opposing end surfaces of said one of said movable section and said fixation section.

6. The method of producing a piezoelectric /electrostrictive device according to claim 1, wherein said first substrate comprises a bulk metal member.

7. The method of producing a piezoelectric /electrostrictive device according to claim 1, further comprising interposing a plurality of members that are different from a constitutive member of said one of said movable section and said fixation section between said mutually opposing end surfaces thereof.

8. The method of producing a piezoelectric /electrostrictive device according to claim 7, wherein at least one member of said plurality of members comprises an organic resin.

9. The method of producing a piezoelectric /electrostrictive device according to claim 2, wherein said adhesive comprises an organic resin.
10. The method of producing a piezoelectric /electrostrictive device according to claim 2, wherein said adhesive comprises at least one of glass, brazing material, and solder.
11. The method of producing a piezoelectric /electrostrictive device according to claim 4, wherein said window is made by etching.
12. The method of producing a piezoelectric /electrostrictive device according to claim 4, wherein said metal sheets are laminated by diffusion joining.
13. The method of producing a piezoelectric/ electrostrictive device according to claim 1, wherein said metal plates are secured to said first substrate by diffusion joining.
14. A method for producing a piezoelectric/ electrostrictive device comprising:  
a pair of mutually opposing thin plate sections made of metal and a fixation section secured to said thin plate sections by the aid of an adhesive;  
a movable section provided at forward end portions of said pair of thin plate sections; and  
at least one piezoelectric/electrostrictive element arranged on at least one thin plate section of said pair of thin plate sections, said method comprising:  
providing a first substrate;

securing metal plates to said first substrate to form a second substrate; and

subjecting said second substrate to at least one cutting treatment to form one of said movable section and said fixation section;

wherein said metal plates define said thin plate sections and said one of said movable section and said fixation section have mutually opposing end surfaces, a distance between which is not less than a length of said movable section.

15. The method for producing said piezoelectric /electrostrictive device according to claim 14, further comprising the step of securing said piezoelectric /electrostrictive element to an outer surface of at least one of said metal plates by the aid of an adhesive.

16. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said piezoelectric/electrostrictive element is secured to the outer surface of at least one of said metal plates before said metal plates are secured to said first substrate.

17. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said first substrate is composed of a ceramic laminate, and said method further comprises:

laminating and sintering a plurality of ceramic green sheets to form said first substrate, each ceramic green sheet having at least one window formed therethrough; and

securing said metal plates to said first substrate by the aid of said adhesive.

18. The method for producing said piezoelectric /electrostrictive device according to claim 17, wherein portions of said plurality of ceramic green sheets define said mutually opposing end surfaces of said one of said movable section and said fixation section.
19. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said first substrate comprises a metal laminate, and said method further comprises laminating a plurality of metal sheets to form said first substrate, wherein each metal sheet has at least one window formed therethrough.
20. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said first substrate comprises a bulk metal member.
21. The method for producing said piezoelectric /electrostrictive device according to claim 14, further comprising interposing a plurality of members that are different from a constitutive member of said one of said movable section and said fixation section between said mutually opposing end surfaces thereof.
22. The method for producing said piezoelectric /electrostrictive device according claim 21, wherein at least one member of said plurality of members comprises an organic resin.

23. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said adhesive comprises organic resin.

24. The method for producing said piezoelectric /electrostrictive device according to claim 14, wherein said adhesive comprises at least one of glass, brazing material and solder.

25. The method for producing said piezoelectric /electrostrictive device according to claim 1, wherein said metal plates defining said thin plate sections define said mutually opposing end surfaces of said one of said movable section and said fixation section.